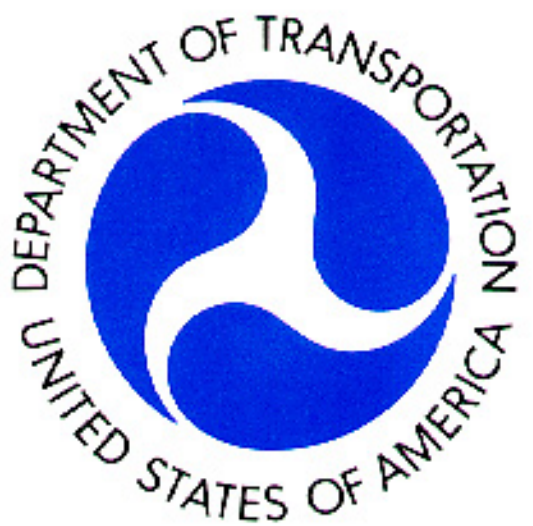
Office of Inspector General

Audit Report

Airway Facilities Maintenance Technician Training

Federal Aviation Administration

Report Number: AV-1999-124
Date Issued: August 18, 1999



Memorandum

U.S. Department of Transportation
Office of the Secretary
Of Transportation
Office of Inspector General

Subject: INFORMATION: Report on Audit of Airway Facilities Maintenance Technician Training
Report No: AV-1999-124

Date: August 18, 1999

From: Alexis M. Stefani
for Deputy Assistant Inspector General
For Aviation

Reply to Attn of: JA-10

To: Federal Aviation Administrator

We are providing this report for your information and use. Your July 23, 1999, comments to our July 9, 1999, draft report were considered in preparing this report.

In your comments to our draft report, you concurred with all three recommendations. We consider your comments and planned actions to be responsive to Recommendations 1 and 2. Therefore, these two recommendations are considered resolved, and no further response is needed. Your progress in implementing the corrective actions for these recommendations is subject to the followup provisions of Department of Transportation (DOT) Order 8000.1C.

Although you concurred with Recommendation 3, the proposed corrective actions do not meet the intent of our recommendation that FAA should develop a short term plan to convert courses to computer-based instruction that results in the greatest amount of cost savings. Therefore, in accordance with DOT Order 8000.1C, we request you provide us with a description of actions planned on this unresolved recommendation within 30 days of this report.

We appreciate the cooperation and assistance provided by your staff during the audit. If I can answer any questions or be of further assistance, please contact me on x60500, or David Dobbs, Director for Aviation Operations Audits on x61401.

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Attachment

EXECUTIVE SUMMARY

Airway Facilities Maintenance Technician Training

Federal Aviation Administration

Report No. AV-1999-124 ***August 18, 1999***

Objective

The objective of our audit was to evaluate Airway Facilities' progress in designing and implementing training and career development programs for the maintenance technician workforce that meet current and future requirements of the National Airspace System (NAS).

Background

The FAA Airway Facilities maintenance technician workforce is responsible for the safety, efficiency, and reliability of the facilities, equipment, and systems that comprise the NAS. As of September 1998, FAA employed 8,777 maintenance technicians responsible for maintaining more than 40,000 pieces of equipment or systems at over 6,000 locations. To ensure the effective operations of the NAS infrastructure, it is important that FAA have a sufficient number of certified journeyman-level[1] maintenance technicians.

To reach journeyman level, maintenance technicians must be certified on the specific systems they will maintain. Although non-certified technicians can repair and replace equipment, only certified technicians can certify that the equipment is operating within specifications. Only then can the equipment be used in controlling air traffic.

[1] Journeymen are Field Grade (FG) 12 maintenance technicians that have met prescribed certification and training requirements, and are performing at the full performance level. Technicians promoted to FG-13 are designated supervisors.

EXECUTIVE SUMMARY

In the past, the certification and training processes for technicians has proven to be lengthy. First, technicians had to complete formal training to gain a fundamental knowledge of the system. Formal training was accomplished through courses offered at the FAA Academy (Academy) in Oklahoma City or occasionally through distance learning modules at the technician's work site. For example, technicians training to become certified on the Voice Switching and Control System had to undergo a 12-week formal training course at the Academy.

Next, technicians began on-the-job training (OJT) to gain critical hands-on experience and specific technical knowledge of the system. OJT is maintenance performed by the trainee under the supervision of journeyman-level technicians, usually at the trainee's work site. Finally, technicians had to pass a certification examination. In the past, this process could take up to 5 years, depending on the system or equipment.

The training and certification processes also affect technician staffing. For example, technicians attending off-site training, sometimes up to 12 weeks at a time, must be replaced on the watch schedule (days and time periods that technicians are scheduled to work) with other technicians who are usually working overtime. To meet maintenance technician staffing requirements, FAA budgeted $11.7 million for overtime in FY 1999.

Recognizing the need to improve the technician training and certification processes, in 1996, an Airway Facilities training work group conducted a study of maintenance technician training and certification issues. The work group's report (issued in July 1996) identified several program weaknesses and provided 23 recommendations to improve the certification and training processes in the areas of:

- hiring,
- distance learning,
- on-the-job training,
- waivers, and
- administration.

Results in Brief

Improvements Made. FAA has taken steps to reduce the cost and time required to certify maintenance technicians on the equipment and systems they

maintain. For example, FAA has eliminated common principles training (basic electronics and math courses) for newly hired technicians and replaced it with a pre-hire screening process to test applicants' knowledge of math and electronics. Eliminating the course reduces the time to certify technicians by 10 weeks and should save FAA nearly $4 million annually.

FAA has also eliminated 1 year in grade requirements for technician promotions and replaced them with specific training and certification provisions. With the time requirement lifted, technicians can now be promoted based on their skills and abilities. Eliminating the time in grade requirement has reduced the time required for technicians to progress to the journeyman level.

FAA Needs To Provide Timely and More Cost-Effective Training. FAA has made some progress in improving its maintenance technicians training program; however, additional opportunities are available to improve its maintenance technician training program. For example, in FY 1999 FAA developed and conducted a course that provides standardized OJT instructional methods to technicians who conduct OJT for junior technicians. FAA plans to train about 1,000 OJT instructors by the end of FY 2001. However, FAA needs to further improve its maintenance technician training and certification processes by implementing more cost-effective training methods. Specifically, the work group's recommendations concerning improving the quality of OJT and converting Academy courses to computer-based instruction (CBI) have not been fully implemented.

In 1996, the work group found that OJT was of inconsistent quality and recommended formalizing the process by generating an OJT package for each piece of equipment or system. More than 2 years after the study, OJT packages have been developed for only 38 of 148 systems that require standardized packages.

We also found technicians frequently did not receive timely OJT instruction after undergoing formal training and consequently did not become certified on the equipment they trained on. For example, at our request, training personnel in FAA's Eastern Region Liberty Systems Management Office identified 105 technicians who received training on 35 systems up to 5 years ago but never became certified to maintain the equipment because they never received OJT.

The Airway Facilities training work group also recommended using CBI to replace many Academy courses in order to reduce travel and overtime costs

and minimize the impact on staffing. The working group's report identified 12 courses that could be converted to CBI, which could save the agency $8 million over a 7-year period. However, only 6 of the 12 courses have been converted to date.

Other courses could also be converted to CBI. According to the Airway Facilities Training Division Manager, portions of all the 139 courses taught at the Academy could be converted to CBI. For example, the manager indicated that converting the Airport Surveillance Radar (ASR)-9 course to CBI would reduce the class time at the Academy from 9 to 5 weeks.

Additionally, greater use of CBI will reduce travel and overtime costs associated with sending technicians to the Academy. By increasing its commitment to the OJT and CBI programs, FAA could make more efficient use of training funds, reduce overtime needed to meet work requirements while technicians are attending off-site training, and offset some of its budgetary shortfall.

Recommendations

To improve its maintenance technician training and certification processes, we recommended FAA:

- develop and use standardized OJT packages for the equipment that requires an OJT package,

- implement procedures to ensure that technicians who undergo formal training receive the OJT necessary to become certified, and

- determine which FAA Academy resident courses would result in the greatest rate of return if they were converted to CBI and develop a plan to convert those courses.

FAA Comments and OIG Response

FAA concurred with Recommendations 1 and 2 and stated that a contract was issued to develop OJT packages for the 20 highest priority systems and templates will be developed and used to ensure standardization of OJT packages. FAA also indicated that policy is being rewritten to require the completion of OJT prior to granting certification authority. FAA plans to complete these actions by FY 2001.

Although FAA concurred with Recommendation 3, its response did not meet the intent of the recommendation. Specifically, FAA's response did not address what actions it would initiate concerning developing a short term plan to convert courses to CBI. FAA also stated that if it is to fully implement the report's recommendations within a reasonable time frame, dedicated funds must be fenced for this purpose. We disagree that FAA needs to fence funds for training. Rather, FAA needs to use their available training funds more wisely and take greater advantage of more cost-effective training methods.

Results and Recommendations

Improvements Have Reduced Training Costs and the Time Required to Reach Journeyman Level. FAA has long-recognized that improvements were needed in hiring and career development programs in order to reduce the cost and time to certify maintenance technicians. For example, in July 1996, the Airway Facilities training work group reported that a required 10-week course at the Academy in basic math and electronics for newly hired technicians was no longer economically feasible and recommended replacing the course with a pre-hire screening examination.

In response to this recommendation, FAA eliminated the common principles course and implemented the Basic Electronic Skills Test (BEST) in October 1998. BEST is used to ensure that prospective technicians possess basic knowledge in math and electronics. Eliminating the common principles course will save FAA nearly $4 million annually and reduce the time required to certify maintenance technicians by 10 weeks.

As a result of flexibilities provided by personnel reform legislation in 1996, FAA eliminated the 1 year in grade requirement for technician promotions and replaced them with specific training and certification provisions. With the time requirement lifted, technicians can now be promoted based on their skills and abilities. For example, in the first 8 months after the policy became effective, 63 (29 percent) of 218 promotions in the FAA Southwest Region were for technicians with less than 1 year in grade. Therefore, eliminating the 1 year in grade requirement will reduce the overall time needed for technicians to advance to the journeyman level.

FAA Needs To Provide Timely and More Cost-Effective Training. FAA has made progress in improving its OJT program. For example, in FY 1999 FAA developed and conducted a course that provides standardized OJT instructional methods to technicians who conduct OJT for junior technicians. FAA plans to train about 1,000 OJT instructors by the end of FY 2001. However, FAA needs to further improve its maintenance technician training and certification processes by implementing more cost-effective training methods. Specifically, the work group's recommendations concerning the quality of OJT packages and converting Academy courses to CBI have not been fully implemented.

For example, in 1996, the Airway Facilities training work group found that OJT was of inconsistent quality and recommended formalizing the process by generating a standardized OJT package for each piece of equipment or system. More than 2 years after the study, OJT packages had been developed for only

38 of 148 systems that require standardized packages. For example, no standardized OJT packages have yet been developed for two major systems – the Voice Switching and Control System (VSCS) and the Airport Surface Detection Equipment System (ASDE-3).

Although FAA has identified the 20 highest priority systems requiring OJT packages (including VSCS and ASDE-3), the Airway Facilities Training Division Manager was unable to estimate when these packages would be completed because development of standardized packages is dependent upon the availability of funding.

We also found technicians frequently did not receive OJT instruction after undergoing formal training and consequently did not become certified on the equipment they trained on. For example, at our request, training personnel in FAA's Eastern Region Liberty Systems Management Office identified 105 technicians who received training on 35 pieces of equipment up to 5 years ago but never became certified to maintain the equipment because the technicians never received OJT. As shown in the following table, the time that elapsed since these technicians completed formal training ranged from 6 months to 5 years.

Trained Technicians but Not Certified
(Eastern Region)

Number of Technicians Trained But Not Certified	Amount of Time Since Completion of Training
38	6 months – 1 year
34	1 to 3 years
33	3 to 5 years
105	

During the audit, the Manager of the Liberty Systems Management Office recognized this weakness and stated that they planned to implement procedures to ensure that technicians receive OJT in a timely manner after completing formal training. FAA should take similar action agencywide to ensure that all technicians who undergo formal training receive the OJT necessary to become certified.

Greater Use of Computer-Based Instruction Could Have Positive Impacts on the Cost and Staffing Implications of Technician Training. The work group also recommended using more distance learning tools, such as CBI and correspondence courses. Specifically, the work group recommended using CBI to replace many Academy courses in order to reduce travel and overtime

costs and minimize the impact on staffing. For example, the work group recommended converting a 5-day course on the Radar Acquisition Subsystems to CBI. In total, the report identified 12 courses that could be converted to CBI, which could save the agency $8 million over a 7-year period. However, only 6 of the 12 courses had been converted to date. The remaining courses are still taught only at the Academy. These courses included training on the VSCS Emergency Access Radio and the Mode S Video Reconstituter equipment.

Other courses could also be converted to CBI. We analyzed an April 1999 listing of all available maintenance technician technical training courses and found that 77 courses were available on CBI. However, we also found that 139 courses were taught only at the Academy. According to the Airway Facilities Training Division Manager portions of all 139 courses could be converted to CBI. For example, the manager indicated that converting the Airport Surveillance Radar (ASR)-9 course to CBI would reduce the class time at the Academy from 9 to 5 weeks and allow the technicians to complete the course with 4 weeks of CBI training at the work site. However, the manager stated that the courses have not been converted due to funding constraints.

Increased Commitment to OJT and CBI Would Improve Maintenance Technician Training. The Training Division Manager stated that not all of the 1996 report's recommendations concerning OJT and CBI were implemented in FY 1997 or 1998 because of competing funding priorities. These conditions are continuing in FY 1999 as a result of a $284 million shortfall in FAA's Operations funding. Airway Facilities plans to address its share of the shortfall primarily through reductions in "system support" activities including reductions in technical training ($5.5 million), reductions in contract maintenance ($10 million), and delays in hiring new maintenance technicians ($2.9 million).

To mitigate budgetary shortfalls, FAA needs to make more efficient use of training funds by increasing its commitment to OJT and CBI. Specifically, to improve OJT, FAA must take steps to ensure that newly hired technicians are certified quickly and with minimal impact on staffing. Developing standardized OJT packages and ensuring that all technicians who undergo formal training receive OJT are two important steps in ensuring that maintenance technicians become certified in a timely manner at reduced costs.

Likewise, FAA needs to take greater advantage of more cost-effective training methods, such as CBI. Increased use of CBI could reduce travel and overtime costs associated with sending technicians to training at the Academy. Additionally, CBI minimizes impact to technician staffing. Consequently, to

ensure more efficient use of training funds, FAA should determine which courses taught at the Academy would result in the highest rate of return if they were converted to CBI and then develop a plan for converting those courses. Furthermore, investing in conversion of Academy courses to CBI courses will ultimately save FAA considerable training related costs, and hence help offset some of FAA's general funding dilemmas.

Recommendations

We recommend FAA:

1. Develop and use standardized OJT packages for equipment that requires an OJT package.

2. Implement procedures to ensure that technicians who undergo formal training receive the OJT necessary to become certified.

3. Determine which Academy resident courses would result in the greatest rate of return if they were converted to CBI and develop a short term plan to convert those courses.

Management Position

FAA concurred with Recommendation 1 and stated that after a June 1998 funding request to develop OJT packages for 150 systems was scaled back, a prioritization model was developed and used to identify the top 20 systems that need OJT packages. A contract has been issued for the development of the top 20 OJT packages. Work is currently underway to develop templates that will be used to ensure standardization in the development of all OJT packages. FAA also stated that it is committed to fund development of the remaining OJT packages, which will be completed by 2001.

FAA concurred with Recommendation 2 and indicated that FAA Order 3400.3G, Airway Facilities Maintenance Personnel Certification Program, is being rewritten to add the requirement for completion of OJT prior to granting certification authority. In addition, OJT and/or performance exams are referenced in FAA/Airway Facilities Orders 3000.6X (Training), 3000.10X (Airway Facilities Maintenance Technical Training Program), and 3400.3X (Airway Facilities Maintenance Personnel Certification Program). Efforts are also currently underway to revise and update these Orders. Completion of this effort is scheduled to coincide with conclusion of the OJT package development effort in early FY 2001.

FAA also concurred with Recommendation 3 and stated that a formal process exists for an annual Airway Facilities review of resident courses to determine the most efficient means of delivery. Each year, the FAA Academy recommends the conversion of several resident courses to some form of distance learning. This may be CBI, correspondence study, or a combination of CBI with a resident lab. Although CBI courses do reduce the time that a student spends at the Academy, the student utilizing CBI is still "in training". This will not reduce the need for backfill overtime. FAA will continue its annual review of Academy resident courses and convert those that provide the greatest rate of return as funding permits.

FAA also stated that their studies have identified the same problems and solutions that have been implemented in all areas where OIG recommendations were made. However, the overriding issue is insufficient funding and if this is not addressed, the same problems will continue to escalate. Airway Facilities has taken steps to restrict budget cuts in the training program by pointing out the operational and safety issues. FAA stated that if it is to fully implement the OIG recommendations within a reasonable time frame, adequate, dedicated funds must be fenced for this purpose.

Audit Comments

The planned corrective actions for Recommendations 1 and 2 are responsive to the report's recommendations and should improve training for Airway Facilities maintenance technicians.

FAA's reply to Recommendation 3 did not meet the intent of the recommendation, which was for FAA to identify those courses currently taught at the Academy and develop a short term plan to convert those courses to CBI that would result in the greatest rate of return, and then use that plan to request funding. FAA's response did not address what actions it would initiate concerning developing a short term plan to convert courses to CBI. FAA's response that it only recommends the conversion of several courses to some form of distance learning implies the process is based on available funding for a particular year. Instead, we believe a better approach would be for FAA to develop a short term plan that would include expected savings that would be realized by converting courses, and then use that plan to convert Academy taught courses to CBI. Without a commitment to develop a plan to convert portions of all 139 courses taught only at the Academy, only minimal progress will be made in expanding its use.

We also disagree with FAA's comment concerning the need for FAA to fence funds for training in order to implement our recommendations. Instead of fencing funds for training, FAA needs to make more efficient use of its available training funds. This is especially important since it is highly unlikely that FAA's funding for maintenance technician training will significantly increase in the near future. Accordingly, FAA must make wiser use of its limited resources. Developing and using standardized OJT packages and converting more courses to CBI are two cost-effective training methods available for FAA to maximize the use of their training funds.

EXHIBIT

Audit Methodology and Scope

The audit was conducted between April 1998 and February 1999 at FAA Headquarters, and FAA's Southwest and Eastern Regions. Additionally, we interviewed representatives from the Professional Airways Systems Specialists (PASS) union and officials of a corporation that develops and operates communications and information processing systems. We reviewed applicable FAA policies and procedures for administering the training program. We also identified and evaluated management controls established by FAA to administer the maintenance technician training program.

We obtained and analyzed a comprehensive, internal 1996 FAA study on technical training for maintenance technicians. Because this report identified training program deficiencies and provided numerous recommendations for corrective action, we evaluated Airway Facilities' progress in implementing the report's recommendations. For example, we reviewed actions taken by Airway Facilities to: improve its hiring practices for new technicians, develop a national OJT training program, and maximize the use of CBI.

During visits to maintenance facilities in FAA's Southwest and Eastern Regions, we interviewed maintenance technicians and maintenance supervisors. We also attended the Airway Facilities FY 1999 Programming Conference held at the FAA Academy.

We also obtained and reviewed FAA budget data. Additionally, we obtained and analyzed FAA data on the number of facilities maintained by maintenance technicians, as well as projected delivery schedules for new systems.

To evaluate Airway Facilities' progress in implementing a career development program, we reviewed actions taken since implementation of Personnel Reform Implementation Bulletin (PRIB) 21-2 in October 1997. Since PRIB 21-2 eliminated the minimum 1 year in grade between promotions, we reviewed all maintenance technician promotions in one FAA region from October 1997 through May 1998 to determine if technicians were afforded an opportunity for accelerated advancement.

We conducted the audit in accordance with Government Auditing Standards prescribed by the Comptroller General of the United States and included such tests as were considered necessary under the circumstances. We designed the audit steps to provide reasonable assurance of detecting abuse or illegal acts.

U.S. Department
of Transportation
**Federal Aviation
Administration**

Memorandum

Subject: **INFORMATION**: Airway Facilities Maintenance Technician Training

Date: JUL 2 3 1999

From: Assistant Administrator for Financial Services/CFO

Reply to Attn. of:

To: Deputy Assistant Inspector General for Aviation

As requested in your July 9 memorandum, we have reviewed the subject report. Our response is attached.

If you have questions or need further information, please contact Anthony Williams, Management Progams Division, APF-200. He can be reached at (202) 267-9000.

John F. Hennigan

for Carl B. Schellenberg

Attachment

Federal Aviation Administration's (FAA) Response to the Office of Inspector General's (OIG) Draft Audit Report on Airway Facilities Maintenance Technician Training

OIG Recommendation 1: Develop and use standardized OJT packages for equipment that requires an OJT package.

FAA Response: Concur. An effort conducted during 1998 found that 175 certifiable systems exist which require on-the-job training (OJT). Of these 175 systems, 25 have OJT packages. In June of 1998, funding was requested to develop 150 OJT packages and revise the 25 that exist. Even though the scope has been scaled back, as a first step, a prioritization model was developed and used to identify the top 20 systems that need OJT packages. Work is currently underway to develop templates that will be used to ensure standardization in the development of all OJT packages. The templates will assist contractors and OJT instructors in this development effort. Policy will require the Airway Facilities (AF) Training Division to review and approve these courses prior to their release for use in the field. In order to provide OJT instruction and develop OJT packages, completion of the AF OJT Techniques course is required. A contract has been issued for the development of the top 20 priority OJT packages. We are committed to fund development of the remaining OJT packages, which will be completed by 2001.

The FAA has trained over 350 AF OJT instructors and is on target with its plan to train a total of 1,000 AF OJT instructors by the end of FY 2001. All OJT instructors are required to use formal OJT packages that have been approved by the FAA. Centralized Personnel Management Information System (CPMIS) course numbers will be assigned to all official OJT packages.

OIG Recommendation 2: Implement procedures to ensure that technicians who undergo formal training receive the OJT necessary to become certified.

FAA Response: Concur. FAA Order 3400.3G, Airway Facilities Maintenance Personnel Certification Program, is being rewritten to add the requirement for completion of OJT prior to granting of certification authority. This process will be as follows:

Successful completion of formal equipment training will automatically generate notification of the OJT requirement and mailing of the OJT package to the employee's System Management Office (SMO) manager. The SMO manager or designee will log receipt of the OJT package and forward it to the employee's supervisor. The supervisor will assign an OJT instructor and provide the OJT package, along with instructions to both the instructor and student. The instructor and student will acknowledge commencement of the OJT training by signing the course documentation and forwarding copies to the SMO and the

Mike Monroney Aeronautical Center, AF Division, AMA-400. The OJT must be completed and the performance exam taken within 90 days of signing the documentation. Completion of the performance exam is entered into CPMIS and becomes official record in the employee's training history.

On-the-job training and/or performance exams are referenced in FAA/AF Orders 3000.6X (Training), 3000.10X (Airway Facilities Maintenance Technical Training Program), and 3400.3X (Airway Facilities Maintenance Personnel Certification Program). Efforts are currently underway to revise and update these Orders. Completion of this effort is scheduled to coincide with conclusion of the OJT package development effort in early FY 2001.

Recommendation 3: Determine which Academy resident courses would result in the greatest rate of return if they were converted to CBI and develop a short term plan to convert those courses.

FAA Response: Concur. A formal process exists for annual AF Academy review of resident courses to determine the most efficient means of delivery. Each year AMA-400 recommends the conversion of several resident courses to some form of distance learning. This may be computer-based instruction (CBI), directed study via correspondence, or a combination of CBI with resident lab, which is the case in the ASR-9 course mentioned in the Management Consulting Staff report. Although CBI courses do reduce the time that a student spends at the academy, the student utilizing CBI is still "in training". This will not reduce the need for backfill overtime. The FAA will continue its annual review of academy resident courses and convert those that provide the greatest rate of return as funding permits.

The FAA concurs with all OIG recommendations. FAA studies have identified the same problems and solutions that have been implemented in all areas where OIG recommendations were made. However, the overriding issue is insufficient funding and if this is not addressed, the same problems will continue to escalate. AF has taken steps to restrict budget cuts in the training program by pointing out the operational and safety issues. If the FAA is to fully implement the OIG recommendations within a reasonable time frame, adequate, dedicated funds must be fenced for this purpose.